4. GENERAL REQUIREMENTS

4.1 Overview. To exchange NITFS messages between systems, the participants must agree on the mechanism and protocols to be used to support the exchange. In some cases, connectivity and transfer protocols already may exist; for instance, Defense Information Systems Network (DISN)-connected hosts can use File Transfer Protocol (FTP) for moving standard format files. In other cases, connectivity is available, but common transfer protocols are not, or the available protocols are intolerably inefficient; for instance, DISN protocols run very slowly over slow-turnaround half-duplex circuits, and cannot run at all over simplex circuits. TACO2 provides efficient NITFS message transfer across point-to-point and point-to-multipoint links (tactical radio circuits) where neither DISN nor other current GOSIP protocols are suitable.

4.1.1 Approach. TACO2 uses a layered model, similar in philosophy to the ISO Open Systems Interconnection Reference Model. The TACO2 model is shown on figure 1; the components are described in the following subparagraphs.

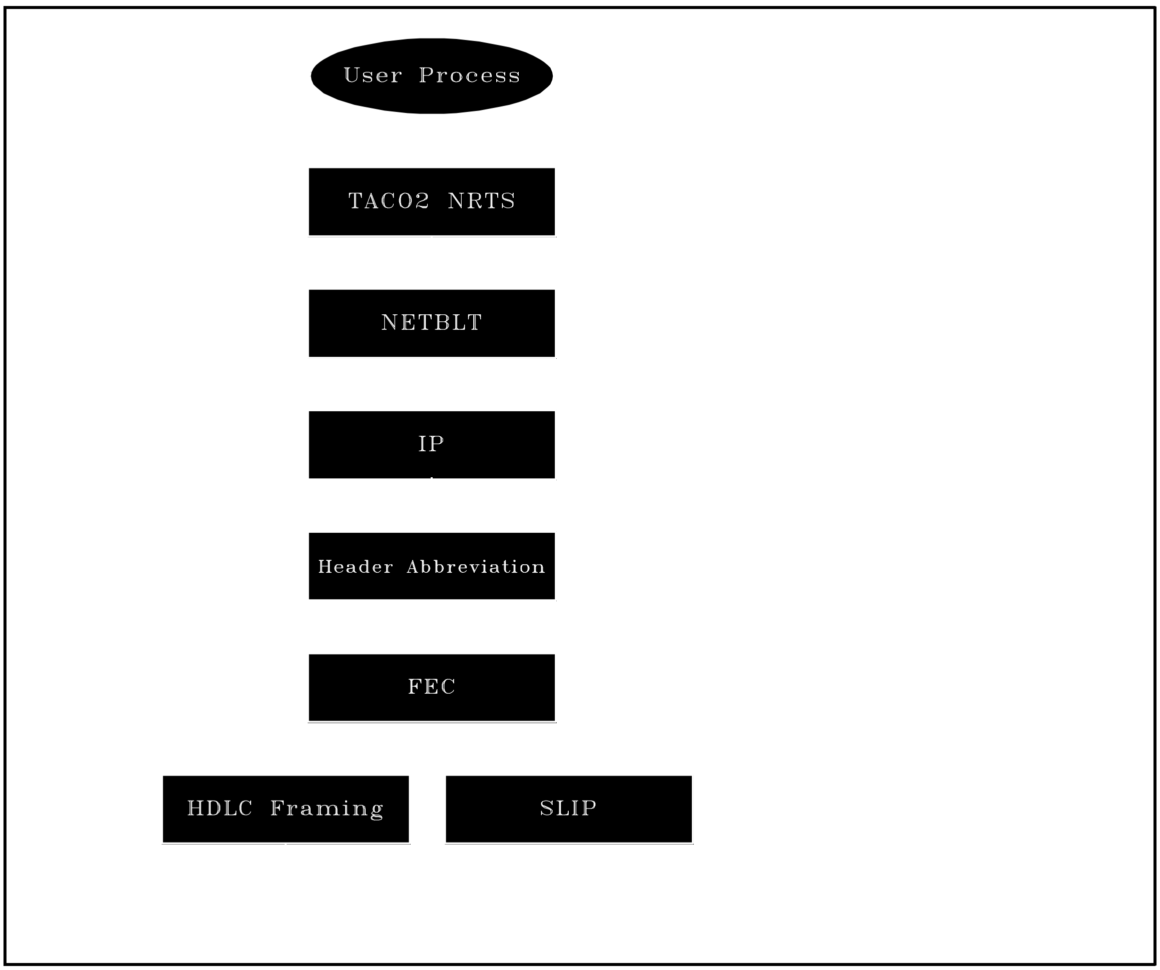


FIGURE 1. The TACO2 message transfer reference model.

4.1.2 NITFS reliable transfer server for TACO2 (TACO2 NRTS). The TACO2 NRTS controls the communications service to be used, exchanges the message and associated information with it, and acts as a session layer to allow resumption of interrupted transfers.

4.1.3 NETBLT. NETwork BLock Transfer (NETBLT) shall provide the reliable, flow-controlled transport level protocol designed to achieve high throughput across a wide variety of networks. It allows the sending client (the NRTS) to break the message being sent into a series of buffers, and to pass those buffers to NETBLT as information or space availability permits. Buffers are broken into packets for transmission. The critical element for performance is multiple buffering, so that new buffers can be sent while earlier ones await confirmation, and packet flow can be nearly continuous fro[illegible]eiver. NETBLT uses a system of timers, acknowledgments, and recovery mecha[illegible] network congestion, long delays, and errors. NETBLT can operate in full-duplex [illegible]odes. The simplex case uses a stri[illegible]ion of the same NETBLT proto[illegible]

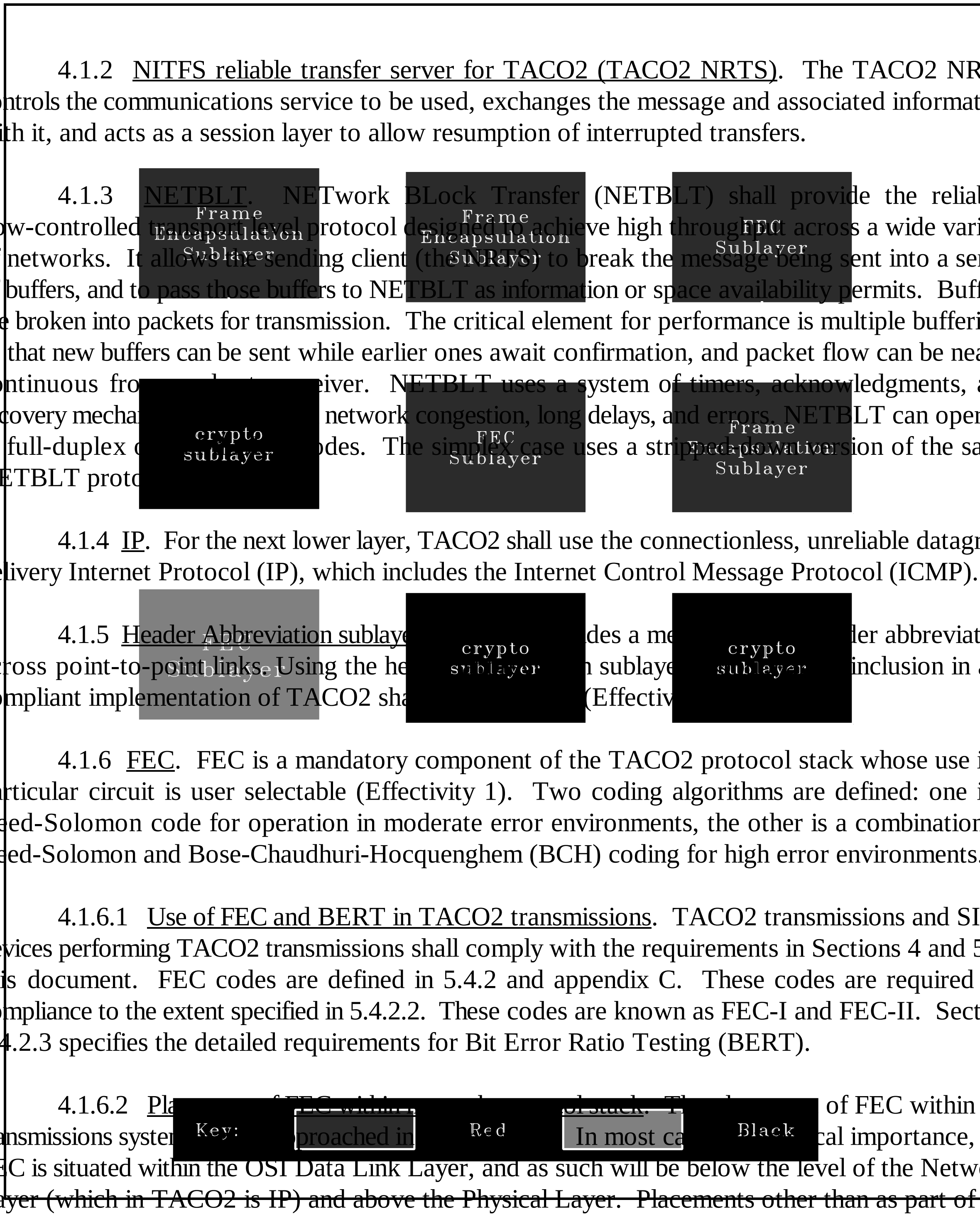
4.1.4 IP. For the next lower layer, TACO2 shall use the connectionless, unreliable datagram delivery Internet Protocol (IP), which includes the Internet Control Message Protocol (ICMP).

4.1.5 Header Abbreviation sublaye[illegible]des a me[illegible]der abbreviation across point-to-point links. Using the he[illegible]n sublaye[illegible]inclusion in any compliant implementation of TACO2 sha[illegible](Effectiv[illegible]

4.1.6 FEC. FEC is a mandatory component of the TACO2 protocol stack whose use in a particular circuit is user selectable (Effectivity 1). Two coding algorithms are defined: one is a Reed-Solomon code for operation in moderate error environments, the other is a combination of Reed-Solomon and Bose-Chaudhuri-Hocquenghem (BCH) coding for high error environments.

4.1.6.1 Use of FEC and BERT in TACO2 transmissions. TACO2 transmissions and SIDS devices performing TACO2 transmissions shall comply with the requirements in Sections 4 and 5 of this document. FEC codes are defined in 5.4.2 and appendix C. These codes are required for compliance to the extent specified in 5.4.2.2. These codes are known as FEC-I and FEC-II. Section 5.4.2.3 specifies the detailed requirements for Bit Error Ratio Testing (BERT).

4.1.6.2 Pla[illegible]ol stack. The [illegible] of FEC within the transmissions syste[illegible]proached in[illegible] In most ca[illegible]cal importance, the FEC is situated within the OSI Data Link Layer, and as such will be below the level of the Network Layer (which in TACO2 is IP) and above the Physical Layer. Placements other than as part of the Data Link Layer are possible; these possibilities are not treated in this document.



4.1.6.3 Placement of FEC within data link layer. Three possible placements of FEC within the Data Link Layer are illustrated on figure 2. Each placement shown is applicable to NITFS transmissions. The placement shown on figure 2, known as packet coding, allows implementation in software and shall be the placement used for the FEC-I and FEC-II codes.

FIGURE 2. Possible positioning of the FEC within the data link layer.

4.1.7 HDLC and SLIP. HDLC and SLIP shall provide link-layer packet encapsulation for synchronous and asynchronous links respectively. TACO2 uses only the framing, bit-stuffing, and Cyclic Redundancy Check (CRC) components of HDLC. SLIP is a simple mechanism that provides encapsulation and byte-stuffing for use across asynchronous links.

4.1.8 Physical layer. The physical layer used with TACO2 depends on the cryptographic device and communications circuit used. The requirements for specific circuits are published as DISA/JIEO Technical Interface Specifications. Signal voltage sense shall be as specified in MIL-STD-188-114A.

4.2 Notation.

4.2.1 Hexadecimal representation. Throughout this document, a sequence of digits preceded by 0x (digit zero) is taken to be a hexadecimal integer. The hexadecimal digits include A through F, which represent the decimal values 10 through 15.

4.2.2 Data transmission order. The order of transmission of the header and data described in this document is resolved to the octet level. Whenever a diagram shows a group of octets, the order of transmission of those octets shall be the normal order in which they are read in English. On figure 3, the octets are transmitted in the order in which they are numbered.

FIGURE 3. Transmission order of bytes.

Whenever an octet represents a numeric quantity, the left most bit in the diagram is the high order or most significant bit (MSB). The bit labeled 0 is the MSB, and the bit labeled 7 is the least significant bit (LSB). For example, figure 4 represents the value 106 (decimal), which is 0x6A (hexadecimal).

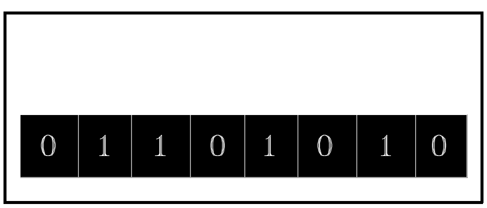


FIGURE 4. Significance of bits.

Similarly, whenever a multi-octet field represents a numeric quantity, the left most bit of the whole field is the most significant bit. When a multi-octet quantity is transmitted the most significant octet shall be transmitted first. Bit transmission order shall be as specified by the link layer (normally LSB first).